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5 Marketing Chemical Engineering Projects

There are some major differences in marketing engineering projects in comparison to the usual B2B marketing. Engineering projects demand a combined package of physical products, such as the construction and delivery of a manufacturing complex, or complete manufacturing plants and the necessary associated services, such as building, staff training, and commissioning operations, as introduced in Section 3.2.6. This makes it necessary that all operations are concentrated on one single client. It is important that the offering company has a good knowledge of the customer's value chain in order to design this bundle of services and products exactly according to the needs of the customer. Whereas in usual B2B marketing the focus is placed on a target group of possible customers, the activities in the marketing of plants are directed to an individual customer. This does not exclude the possibility that a plant may be constructed from standardized modules, however, through the combination of the complex elements and modifications of modules, the plant achieves a unique and individual character. Furthermore, for the supplying companies it means that many years may pass before a chance to win a big contract for the delivery arises, which makes the business and marketing much more difficult. When the plant is finally handed over, no further business can be expected, with the exception of a subsequent service or maintenance contract. Other forms of agreements, however, can be operation contracts, namely that the supplying company runs the plant after completion for some set period.

5.1 Marketing Chemical Plants

In contrast to other marketing areas, the marketing of chemical plants, whether oil refineries, steam hydrocarbon crackers, fiber-producing plants, power stations, or others, is made before the products exist. There is no oil refinery as a demonstration object in the show room of the supplier. This fact has many consequences. As the products cannot be seen or tested beforehand, it is a matter of trust when a client gives an order worth several hundred million dollars to an engineering firm. So, the engineering company has at first to demonstrate its ability to manage such a complex task, the requirements of which are very high indeed. As the supplying company normally does not have all experts at hand, a consortium must be formed,

wherein the company acts as a general contractor. A consortium comprises several dozen subcontractor firms and they in turn may have their own suppliers. An engineering company can in practice demonstrate their management and technical abilities only through reference projects; without such projects the chance of receiving an offer is near to none. This also means that a new engineering company has practically no chance for success. It is a vicious circle: No references means no orders, and subsequently no orders means no references. Furthermore, the financial barriers to market entrance in the plant construction business are very high for new competitors. The expenditures for the acquisition of an order are in no relation to those for other businesses. The necessary preliminary efforts in marketing, personal visits, and generating a qualified offer are extraordinarily high.

Several characteristics and phases in the marketing of chemical plants can be distinguished (compare also Figure 5-1).

- the pre-marketing phase
- the contract or acquisition phase
- the project phase
- the post-project phase

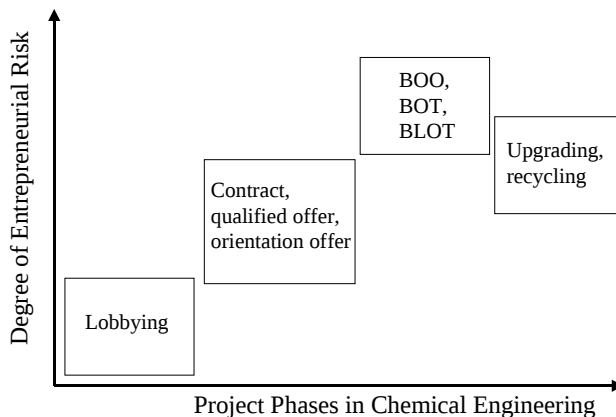


Figure 5-1 Marketing of a chemical engineering project

The market situation is characterized by an unusual transparency because there are only very few customers, either large companies or states and public institutions, who can afford the investment of buying chemical plants. For all market participants in the engineering business, it is obvious who the potential customers are and approximately when new investments can be expected, as the age of existing facilities are known or estimable. According to most national and supranational laws, such large planned investments have to be announced in international newspapers in the form of an invitation for tender.

Now, in the pre-marketing phase, there are two possibilities, either passive, where an engineering company waits for an invitation to bid, or, and preferably, the company is active or even proactive. For the latter, the company tries to gain access to the boardroom of the decision makers in companies and public authorities: a classic lobbying technique. Proactive marketing has different tasks. At first, it is essential to gather information about planned projects as early as possible and, further, to form an in-depth understanding of the client's envisaged working processes. Then, of course it is necessary to demonstrate both technical and management competence. Even more important is to recognize that the key-account managers of the engineering company will try to influence the kind of solution the potential customers desires: When, during the proactive phase, the requirements of the buyer have been already directed towards the strengths of the engineering company, the probability increases that the official offer will fit in a better way than the competitor's one.

The acquisition phase itself can be divided again into several stages. The first stage is an "informative offer", demonstrating interest and competence. The documents outline a principal concept and refer to other reference projects. The first offer is also regarded as a check of one's own chances to win the contract. If the buyer is interested, it will give more detailed information and discusses the project with the engineering company. The second stage is a "qualified offer", requiring much more in detail and, in consequence, demands more effort to precisely formulate the project including all accompanying services and extras. In this situation, it is critical that the general contractor is able to demonstrate solutions which would make the client more successful on the market. The last stage is the definite binding offer. This means that deliveries and prices are fixed and the contract becomes ready to sign. Obviously the entire procedure takes more time than other B2B activities and is costly: The evaluation of a definitive offer for a complex project can amount more than 5 % of the total project cost. From the first contact to the definitive contract, many meetings occur and employees on both sides are involved, spending both time and money.

It is essential that a company establishes an internal evaluation process to improve its chances in gaining the order, otherwise the dozens of elaborate qualified offers, each costing a substantial sum, could eventually ruin the company in the long term. Placing an offer is in itself a considerable financial risk, and it is therefore a question of survival to have an efficient information service in place and an excellent understanding of the market in general and the client's market in particular. The logistics of elaborating offers have to be standardized so far as possible, and of utmost importance is a good reporting system of past projects in order to gain some security for the estimates of time and budget limits.

A special problem during the acquisition phase is establishing the price. This is a very complex and risky process in comparison to other marketing problems. The principal difficulty is that each product is unique and there is little or no possibility for comparison. There is no supply and demand function, as found for commodities or consumer products. Comparison with the competitor's prices is also not possible because they are in the same situation. In other words, there is no set market price already existing for a given gas washing tower with special modifications. A well-

documented collection of case histories is therefore essential, from which at least similar cost structures can be derived. It is also important to know as much as possible about the cost structure of the competitor in addition to their technical capabilities. In this situation, benchmarking (introduced in Section 1.7) may be helpful. The most decisive criteria of the project are listed and then the competencies and potentials of the market participants are compared. The outcome is a profile of one's own company and the competitors showing strengths and weaknesses. Benchmarking can be a very powerful tool; the problem, however, is how to obtain reliable information about competitors.

In the contracting phase, it is essential that, beside all the necessary legal and insurance conditions, an intensive collaboration and exchange of information between the client and the consortium company takes place. Only in this way it is possible that the deliveries will meet the requirements. A joint team of both companies will prepare the essential elements of the contract. Sometimes also outside consultants can be present, who are called in by the client. The presence of consultants is not unusual because the client often does not have sufficient experience in the management of such large projects; it is this outside experience that they need. The time needed in the contracting phase cannot be overestimated, especially in international projects.

Many international projects become still more complex when, beside the technical details, a finance plan is also requested. Developing countries often do not have enough hard currency to finance such projects but their governments wish to accelerate the local technological development. In this case, the offering consortium has to produce a finance plan in conjunction with international banks and financial institutions. A common procedure is that the construction company or the consortium operates the chemical plant for some time to generate a cash flow, which is used as a return on their investment (see Figures 5-2 and 5-3).

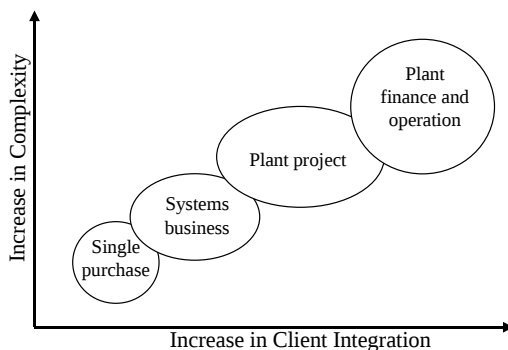


Figure 5-2 Complexity in business-to-business marketing

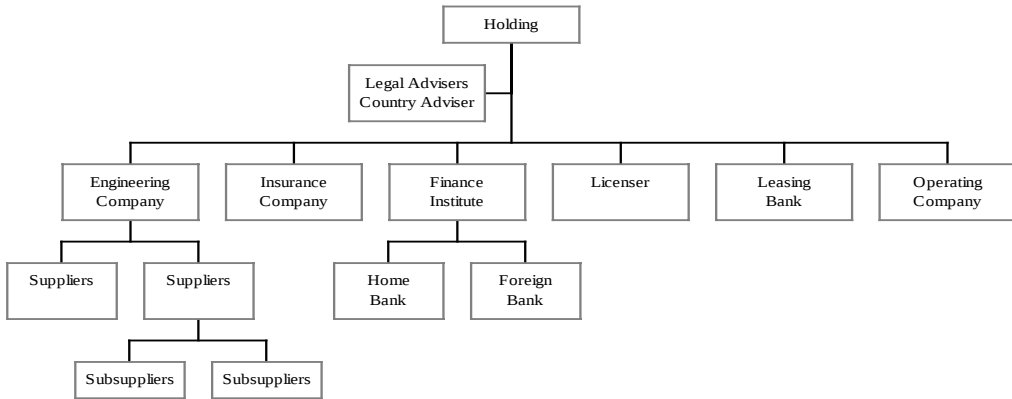


Figure 5-3 Model project consortium

During the project phase, it is essential that the managing company ensures that all the participants in the project work closely together. It is also important to recognize that most of the work has to be performed on site, often in a foreign country under special conditions. Without an effective collaboration with the local managers, engineers, and workers, the project cannot be successful. However, one cannot expect that in developing countries all engineers will have the same standard of qualification as found in Western countries and everyday operating life may be difficult. Nevertheless in all contracts a time limit has been agreed upon, and it is the responsibility of the project management that these limits are observed—in spite of all possible difficulties. Therefore, computer-based project management aids such as CPM (Critical Path Method) or PERT (Program Evaluation and Review Technique) are absolutely necessary in complex projects. Without efficient use of these tools, an engineering company cannot survive. Furthermore, a computer-based management support system is necessary, in which experiences of completed projects are documented appropriately.

After the construction is completed, a post-project phase will follow in most cases. The post-project phase can take several forms. Depending on the contract, an operation phase may follow or, at the end of the chemical plant's lifetime, a phase of deconstruction and recycling occurs, also known as “revamping”, and is form of modular reconstruction and adaptation to more modern technologies. In this connection it is important to refer again to the price-finding process. There is a trend developing that clients ask for the lifecycle cost, the total cost of construction, operation, and recycling. Clearly, for periods of more than 30 years can these costs be only very roughly estimated.

There are three principal models of operation forms:

- BOT Build–Operate–Transfer
- BOO Build–Operate–Own
- BLOT Build–Lease–Operate–Transfer

All three forms represent a certain finance and management style. As already stated, developing countries often do not have the financial potential to buy chemical plants or other larger production facilities, and therefore they ask the supplying company to operate the plant after construction. In such a situation, the project company forms a legal entity, a holding, comprising the general entrepreneur, a bank, an insurance company, and perhaps also a leasing firm, and the government or community. Together they operate the project and accept the entrepreneurial risk. The main advantage is that in this construction the financial security for the bank is given by the operating companies and the cash flow from running operations, independent of what credit standing the country may have at the international scale.

The first possibility, BOT, often is chosen to guarantee the proper function of the plant and to allow a certain period to train the local staff before the transfer takes place. During a relatively long-lasting operation phase under the responsibility of the supplier, cash is generated for the owner and products are made, which may be accepted as a first down-payment from the buyer. For example, the purchaser of an oil refinery pays with the different petrol fractions instead of money. The financial term in economics is a “barter” trade, when no money is involved in a transaction, or “counter trade”, when a payment is made in form of goods which in turn are converted into money. German pipeline producers have accepted the delivery of Russian gas as payment for the delivery of the pipes.

In the second case, BOO, there is no transfer of ownership. In essence, the plant is built on invitation from the host country, where the cheap land and low wages are attractive, and the jobs created and goods manufactures help in the development of the country. The government may hope that, at the end of the amortization time, the owner is willing to negotiate a transfer of the plant to the country at a discount price.

The last model, BLOT, is similar to the first one but it includes a lease period. This is a modification in risk policy: If the supplying company is interested in a quicker return on investment and not willing to maintain a long-lasting financial engagement, it sells the plant to a bank or similar, immediately receives the money, and then leases back the plant from an intermediate leasing institution. The supplying company can then operate the plant as guaranteed in the contract. In this way the company generates a surplus from the beginning. The company is in risk only—beside the usual operating risks—with the payment of the leasing rates (see Figure 5-4).

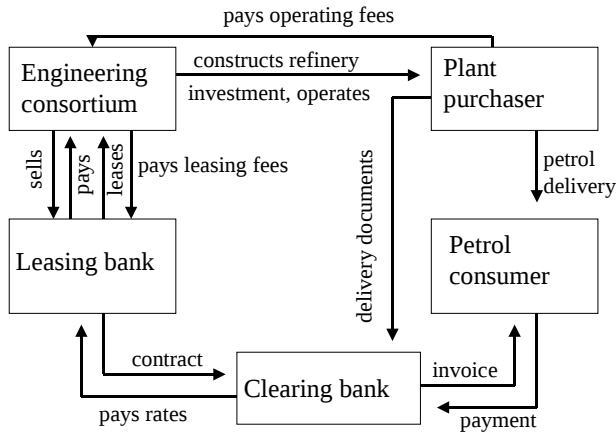


Figure 5-4 Financial construction of a BLOT in the case of a petrol refinery

Another post-project phase is plant recycling. In the past this was often no subject of negotiation. Today however, this part may be a decisive competitive advantage in a contract, when an engineering company is able to demonstrate awareness of ecological aspects.

5.2 Marketing Green Technology

The chemical industries at earlier stages of their development were the source of many environmental problems. Other industry branches and—not to be underestimated—private consumption have also contributed to these problems as well. But since the chemical industries have been the most visible polluters, they therefore became the focus of criticism. However, this industry branch also acquired with time (voluntarily, or by necessity) a deep understanding of the problems and began to develop, together with the machinery industry, highly sophisticated solutions. Today, the market for environmental protection, namely engineering and services, is estimated to a volume of about US\$ 800 billion worldwide. A quarter of this sum stands for Western Europe (see Figures 5-5 and 5-6). The booming business of the last five years, however, has actually slowed because of the Asian economic crisis and the stagnating reconstruction of many Central and Eastern European countries. Nevertheless, green technology has become an important factor in Western economies. This technology comprises in particular:

- waste water treatment
- waste deposition
- air protection
- recycling
- incineration plants
- measuring and regulation technology

Together with the engineering aspects of the business, roughly 60 % of the services are connected. Beside intensive works in connection with engineering, these services are specialty consulting, analytical, and laboratory work.

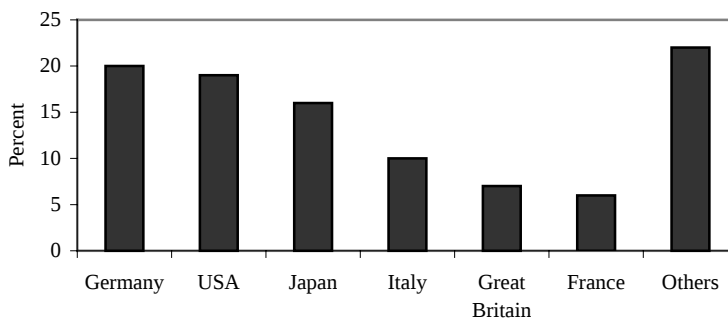


Figure 5-5 Market shares in environmental technology

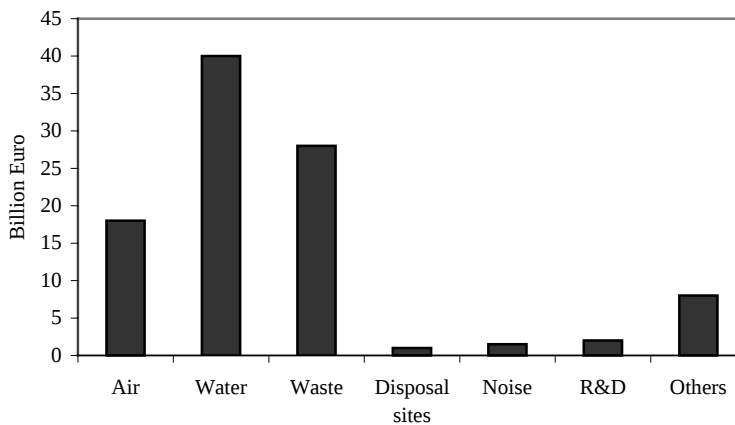


Figure 5-6 European Union expenditures for environment protection

For the European suppliers, the target markets account for about 60 % of all exports to the European market itself, followed by Central and Eastern Europe and the Asian markets in third place. In the world market for suppliers, Germany still holds first place, closely followed by the United States, and Japan in third place. Only a decade, Japan had only a marginal market share in this business branch but within only a few years it has pushed this branch to a leading and strongly competitive supplier to the international markets; Japan is expected to outperform the current market leaders within the next five years. One of the main reasons for this estimate is that the Japanese learn local requirements more deeply and transfer this comprehension into specific solutions.

There are some special elements in the marketing of environmental technologies. The products are very specialized and therefore national markets are rarely sufficient to assure the survival of medium-sized companies. Unfortunately, this category of firm can develop only with great difficulty in the international markets. The financial, personnel, and management efforts required are very high, and technical solutions to environmental problems can hardly be standardized.

A deep understanding of the “local content” of the problem is necessary, as is a good collaboration with all regional stakeholders, the authorities, political parties, and the like. An important part in the acquisition phase therefore depends on a reliable market information system. This in turn requires the formulation of a complete system which fits into the local environment rather than the delivery of single machines or constructions. Again, big companies have a significant advantage.

In addition, many countries which are in urgent need of environmental technologies do not have sufficient financial resources to pay for them. Western suppliers tend make the mistake in offering a “technological overkill”, in which their engineers place emphasis on the most modern technology, which is not affordable for a developing country and is often so complex that a continuously functioning plant cannot be maintained by the local personnel once the construction engineers have left. A thorough training of the local personnel often does not solve this problem because the necessary maintenance cannot be guaranteed.

A particularly important market for environmental technology within Western Europe is the reconstruction and maintenance of the water pipelines. At the beginning of the twentieth century in most countries, the systematic construction of waste-water pipelines began. Many of the existing pipelines therefore are more than 70 years old and in consequence a number are leaking and near to collapse. In Germany for example, the public net accounts for about 400 000 km and the private net is about four times this length. The estimated market for repair and reconstruction is estimated to about € 50 billion within the next 15 years. The problem is complicated further since in most countries the state or the authorized companies must guarantee a high quality of drinking water and are, in addition, liable for that.

Within the environmental protection business a niche market has developed. This market is the biological soil and water treatment. A few smaller high-technology companies have developed processes to clean contaminated soil or waste water with special bacterial cultures, derived from so-called archaea bacteria, among others.

These strains, *Pyrococcus furiosus* or *Archeoglobus veneficus*, have been, as their names suggest, found in submarine volcanoes and survive high pressures and temperatures up to 110 °C. The latter, *A. veneficus*, digests sulfur dioxide and converts it into elemental sulfur. The abilities of these bacteria are quite extraordinary and it is reported that even dioxins can be digested under normal reaction conditions. It can be expected that this market will boom within the next years. Other bacteria have been discovered that can even resist radiation (*Comococcus radiodurans*), which perhaps may be applicable in the treatment of radioactive waste.

However, one should remember that the application of gene-modified bacteria is not only restricted to waste treatment. Classical chemical processes, such as industrial-scale production of the amino acid lysine or antibiotic precursors have been substituted by such bioreactions. These chemical processes are not only much cheaper but also create less polluting byproducts.

In spite of the positive market prognosis, the recycling industries do not share this optimistic view. Most processes, such as the selection of different types of plastic materials from a mixture, have been optimized meanwhile. Nevertheless, most of the procedures still are uneconomic and are subsidized either directly or indirectly. The cost of recycling cannot be calculated from the chemical and mechanical processes alone; rather the entire value chain has to be considered, from waste collection, mechanical “deconstruction” of the objects, selection and separation of the materials, chemical conversion, and through to the reuse of the material. Virgin plastic material is often much cheaper than recycled material.

In the past and especially in Germany, plants for plastic recycling with huge capacities were constructed at the same time when industry realized that such plants generate monetary subsidies. However, the processes turned out to be more difficult than expected, and today the former official policy of reusing a substance has fortunately been modified on consideration that an energetic reuse (such as incineration to produce energy) is an equivalent solution.

The situation differs somewhat for niche markets, such as the recycling of electronic waste. The recovery of noble or rare earth metals contributes to the profitability of the process. However, the content of these metals in modern components has decreased, and there exist serious problems with the flame-retardant materials bound into the plastic parts, which produce brominated dioxins when burnt. Newer materials do not contain such halogenated flame retardants—provided that they are produced by companies which joined the voluntary convention.

Engineers of incineration plants faced some difficult circumstances over the last years. Due to the physical recycling of plastics and paper, the energy content of municipal waste decreased dramatically in Switzerland and Germany. A paradoxical situation arose, and the city of Zurich raised the municipal waste fees because it had to buy oil to keep the incinerators running. Furthermore, the popular acceptance of new incinerators decreased because activists stimulated a fear of dioxin emissions, totally ignoring the developments in new incineration technologies which reduce the dioxin content in flue gas to practically zero.

A major Swiss producer of incinerators ran into serious financial trouble with its self-built and -operated project in the USA when the permission to run the plant

after construction was not granted, which led to long-lasting legal actions and involvement of expensive experts. This project caused such a loss for the company that financial reconstruction was required. The engineering of incineration plants is a very risky business because such projects are never free from political influence and easily become playthings of political parties.